Journal of Non-Crystalline Solids 90 (1987) xi–xix
North-Holland, Amsterdam

CONTENTS

Preface vii

Committees, Sponsors viii

Welcoming Address ix

Contents xi

Section 1. Theory: transport

Conduction bands in a non-crystalline environment (Invited)
Mott, N.F. 1

Theoretical approaches to the interpretation of transport and optical data of amorphous semiconductors (Invited)
Dersch, U., H. Overhof and P. Thomas 9

Some aspects of the transport phenomena near the mobility edge in disordered semiconductors
Zvyagin, I.P. 17

Diffusion and conductivity in percolation systems near the percolation threshold
Arkincheev, V.E., A.M. Baskin and E.G. Batiyev 21

Frequency and time response in relaxation time semiconductors
Viščor, P. and N.B. Olsen 25

Section 2. Theory: excitation, recombination

Low-energy excitations and localized electron states in glassy semiconductors (Invited)
Klinger, M.I. 29

Excitation relaxation processes in amorphous and vitreous materials (Invited)
Malinovsky, V.K. 37

Dispersion and damping of phonon-like excitations in structurally disordered systems
Böttger, H. and D. Wegener 45

Theory of photoexcitation by ultrafast light pulses in disordered solids
Velický, B. and A. Pieczonková 49

Geminate recombination kinetics in amorphous semiconductors
Arkhipov, V.I., V.R. Nikitenko, A.I. Rudenko and S.D. Shutov 53

Section 3. Theory: structures

Pseudopotential model of glassy semiconductors
Evseevichev, N.I. 57

0022-3093/87/$03.50 © Elsevier Science Publishers B.V.
(North-Holland Physics Publishing Division)

Structure disordering in curved space model
Novikov, V.N. 61

The Gauge theory and the topological disorder
Cohen, V. 65

Energy spectrum of stationary states for glassy semiconductors
Balmakov, M.D. 69

The theory of amorphous silicon in the coherent potential approximation (CPA)
Wroński, A.K., M.K. Urbański and S.M. Pietruszko 73

Section 4. Group IV elements: electronic structure, density of states

Electronic structure of hydrogenated amorphous silicon (Invited)
Adler, D. 77

The density of states in undoped and doped amorphous hydrogenated silicon (Invited)
Kočka, J. 91

The electronic structure of a-SiH_x alloys
Wilke, S., J. Mašek and B. Velický 99

Atomic and electronic structure of a-SiH_x based on the large-scale CRN model
Drchal, V. and J. Málek 103

Energetic spectrum of deep localized states of D-centers originated from silicon dangling bonds in a-Si:H
Balagurov, L.A., P. Mackus, E.M. Omeljanovsky and M.N. Starikov 107

Wide Coulomb gap in localized states of 3d-metals in amorphous silicon
Dvurechenskii, A.V., I.A. Ryazantsev, A.I. Yakimov and V.A. Dravin 111

Study of gap states distribution on a-Si:H by means of steady state photoconductivity and photoconductivity response time
Qiu, C. and D. Han 115

Flat band voltage determination from temperature dependent field effect conductance in a-Si:H
Krapchev, A. and A. Haiduk 119

Evaluation of density of states distribution in amorphous silicon films by photoconductivity measurements
Augelli, V., V. Berardi, R. Murri and L. Schiavulli 123

Theoretical and X-ray spectral investigations of density of states in amorphous silicon–germanium layers
Domashevskaya, E.P., E.N. Desyatirikova, A.F. Khokhlov, V.A. Terekhov and Yu.K. Timoshenko 127

Valence band density of states of $^{74}As^+$ implanted amorphous germanium
Petö, G. and J. Kanski 131

Density of states and photoconductivity in hydrogenated amorphous silicon
Domashevskaya, E.P., O.A. Golikova, V.A. Terekhov and S.N. Trostyanskii 135

Section 5. Group IV elements: structure and optical properties

Triplet exciton recombination in a-Si:H
Morigaki, K. and M. Yoshida 139

Study of trapped non-equilibrium carriers in a-Si:H by a two-beam experiment
Wu, W., C. Qiu, S. Zhao and D. Han 147

Influence of deposition rate on ESR signals in a-Si
Wu, Y. and A. Stesmans 151

Electrophysical properties of amorphous silicon films prepared by CVD method
Taurbaev, T.I., Kh.J. Koshumbekov, Kh.K. Mukanov and F.A. Mukashev 155

Recombination mechanisms of photogenerated carriers in a-Si:H
Zherzdev, A.V., A.A. Andreev, A.I. Kosarev, K.V. Kougia and I.S. Shlimak 159

The application of ERD and RBS techniques for determining H depth profiles and impurity contents in a-Si:H layers
Zentai, Gy., F. Pászti and A. Manuaba 163

Thermal and laser treatment of light induced defects in hydrogenated amorphous silicon
Bertolotti, M., A. Ferrari, F. Evangelisti and P. Fiorini 167

Section 6. Group IV elements: transport

The investigation of transport properties in a-Si by fast transient techniques (Invited)
Spear, W.E. 171

Meyer–Neldel rule in undoped a-Si:H, examined by TM–SCLC method
Kočka, J. and F. Schauer 179

Steady-state transport under non-equilibrium conditions in undoped and phosphorus doped a-Si:H at very low temperature
Vaněček, M., J. Kočka, P. Demo, E. Šípek and A. Tříska 183

The effects of sample capacitance and light intensity on the time-of-flight signal in a-Si:H
Tóth, L. and J. Gazsó 187

Field-effect problems with I–V measurements on gap-type a-Si:H specimens
Gazsó, J. and L. Tóth 191

Space charge limited currents under illumination in a-Si:H
Bullot, J., P. Cordier, M. Gauthier and K. Haddab 195

The illumination flux dependence of the photofield-effect current in amorphous silicon
Schropp, R.E.I., T. Franke and J.F. Verwey 199

Evidence for weak electron–multiphonon coupling in a-Si:H and alloys from transient photocurrent analyses
Nebel, C.E. and G.H. Bauer 203

Dangling-bond recombination and photoconductivity of a-Si:H
Kurova, I.A. and I.P. Zvyagin 207

Impurity diffusion in amorphous hydrogenated silicon
Kudoyarova, V.Kh., G.S. Kulikov, E.I. Terukov and K.K. Khodzaev 211

The effect of the morphology on the transport properties of α-Si:H layers
Füstöss-Wégner, M., G. Zentai and L. Pogány 215

Section 7. Group IV elements: device physics, applications

Applications and defects in amorphous silicon (Invited)
LeComber, P.G. 219

Progress in the science and application of amorphous materials (Invited)
Ovshinsky, S.R. and D. Adler 229

Physical aspects of a-Si:H image sensors
Hoheisel, M., G. Brunst and H. Wieczorek 243

Collection efficiency in a-Si:H light converters
Juška, G. 247

Amorphous silicon vidicon target
Nesládek, M., J. Kočka, M. Vaněček, J. Stuchlík, O. Štika, J. Dlouhý, E. Šípek and M. Jedlička 251

Photosensitive a-Si:H devices fabricated by DC magnetron reactive sputtering
Taurbaev, T.I., R.M. Aitmambetov, E.A. Swanbaev, S.M. Manakov and M.D. Suleimenov 255

Section 8. Silicon-based alloys

Deposition of silicon oxide, nitride and oxynitride thin films by remote plasma enhanced chemical vapor deposition (Invited)
Lucovsky, G. and D.V. Tsu 259

Properties of a-SiN_x:H films (Invited)
Stötzel, H. 267

ESR and IR studies on doped a-$Si_{1-x}C_x$:H and a-$Si_{1-x}N_x$:H films (Invited)
Chen, G., F. Zhang, X. Xu and C. Zheng 275

Charge storage in deep traps of a-SiC:H films
Könenkamp, R. 283

IR, ESR and resistivity measurements on amorphous silicon oxi-nitride films prepared by PECVD at low temperature
Cros, Y., D. Jousse, J. Liu and J.C. Rostaing 287

IR and RBS studies of rf sputtered films of vanadium doped silicon dioxide
Delima, J.J., A.J. Snell, K.V. Krishna and A.E. Owen 291

Valence-electron properties of a-$Si_{1-x}C_x$:H studied by UPS and EELS
Xu, X., F. Zhang and G. Chen 295

Injection-electroluminescence in a-$Si_{1-x}C_x$:H/nin$^-$p structure
Zhang, F., Y. Zhang and G. Chen 299

Structural order in a-Si:H:Cl films
Danesh, P., I. Savatinova, E. Anachkova, St. Georgiev, E. Anastassakis and E. Liarokapis 303

Section 9. Preparation, growth kinetics

Growth mechanism in amorphous films: a computer simulation
Manaila, R., A. Devenyi, P.B. Barna, G. Radnoczi and R. Grigorovici 307

Dependence of the columnar structure of obliquely evaporated SiO_x thin films on the angle of deposition and the rate of condensation
Geszti, O., L. Gosztola and E. Seyfried 315

Preparation, structure and optical properties of glasses in the systems selenium–sulphur and tellurium–sulphur
Jecu, D., J. Jaklovszky, A. Trutia, I. Apostol, M. Dinescu, I.N. Mihailescu, G. Aldica, M. Popescu, N. Vlahovici, S. Zamfira, E. Indrea 319

Optical emission spectroscopy of silane/argon magnetron discharges
Suchaneck, G., J.-P. Mönch, K. Schade and W. Paul 323

Preparation of a-Si:H by cross homogeneous CVD method
Koynov, S. and A. Toneva 327

Section 10. Interfaces, surfaces

Structural modelling of the amorphous–amorphous interface
Popescu, M. 331

Current transport mechanisms for the metal-amorphous silicon contact
Il'Chenko, V.V. and V.I. Strikha 335

Injection sensibilization of photoeffect in two-layer glassy semiconductor heterostructures
Andriesh, A.M., E.A. Akimova, A.I. Buzdugan, M.S. Iovu, A.A. Simashkevich and V.I. Verlan 339

Voltage dependent internal photoemission study of the energy band structure of the Al/a-Si:H interface
Peng, S., Z. Su, Z. Lin and G. Chen 343

Schottky barrier on n-GaAs formed by amorphous tungsten silicide
Šmíd, V., S. Kožár, J.J. Mareš, J. Krištofik, J. Zemek, L. Štourač and V. Vlášek 347

Characteristics of electronic processes on the surface of chalcogenide glassy semiconductors
Pivovarova, L.V., A.S. Kotchemirovsky and T.N. Mamontova 351

Section 11. Chalcogenides: structure, general

Quasimolecular defects as a unified microscopic basis of the glassy state (Invited)
Dembovsky, S.A. 355

Pressure-structural and optical studies of glassy chalcogenides (Invited)
Tanaka, K. 363

Medium-range ordering in non-crystalline solids (Invited)
Červinka, L. 371

EXAFS in amorphous materials (Invited)
Manaila, R. and D. Macovei 383

Positron annihilation study of defects and microheterogeneity of chalcogenide glassy semiconductors
Shantarovich, V.P. and B.V. Kobrin 393

Ultrasonic investigation of dynamic properties of the amorphous network
Ďurček, J., I. Jamnický, P. Koštial and L. Štourač 397

New analytic method for investigation of the distribution of bonds in As–S system
Kosek, F., Z. Cimpl, J. Tulka and J. Chlebný 401

Section 12. Chalcogenides: transport

On the doping of chalcogenide glassy semiconductors
Tveryanovich, Yu.S. and Z.U. Borisova 405

D.C. and A.C. electrical transport in AsSeTe system
El-Den, M.B., N.B. Olsen and P. Viščor 413

Impurity conduction of chalcogenide vitreous semiconductors
Baranovskii, S.D., B.L. Gelmont and K.D. Tsendin 417

Ionic diffusion and frequency dependent conductivity in amorphous materials
Kahnt, H. and F. Schirrmeister 421

Persistent photoconductivity in compositional modulated amorphous semiconductors
Chen, K., J. Du, Z. Li, G. Mao and H. Chen 425

Light induced reversible drift mobility effect in a-AsSe thin films
Tóth, L. and L.P. Kazakova 429

Drift mobility in Ge–Se–Ga glasses
Lipinski, A., B. Ziołkowska-Pawlak, W. Mycielski, M. Mitkova and Z. Bontcheva-Mladenova 433

Field disactivation of hole drift mobility in amorphous selenium
Juška, G., K. Arlauskas and S. Vengris 437

Electronic conductivity of $(GeSe_{3.5})_{100-x}Bi_x$ and $(GeS_{3.5})_{100-x}Bi_x$ in solid and liquid states
Vikhrov, S.P. and V.N. Ampilogov 441

Salient features of charge transport in solid and liquid disordered states of the $Ge_{16}Te_{80}X_4$ system
Vikhrov, S.P., V.N. Ampilogov and S.I. Mal'Chenko 445

Photoelectric properties of As_2Se_3 modified with transition (Ni) and nontransition (Bi) metals
Abdulgafarov, S.E., V.L. Averyanov, B.T. Kolomiets and V.M. Lyubin 449

Section 13. Chalcogenides and pnictides: photoluminescence, optical properties

The nature of anomalous temperature dependence of photoluminiscence in glasses
Malinovsky, V.K., V.N. Novikov and A.P. Sokolov 453

Time-resolved photoluminescence in amorphous phosphorus
Sobiesierski, Z. and R.T. Phillips 457

Photoluminescence of the hopping disordered systems with electrical bias
Dulea, M. and A. Aldea 461

Luminescence from very small semiconductor particles - high excitation effects
Ramsden, J.J. 465

Photoluminescence transients in the amorphous Ge_xSe_{1-x} system
Koós, M., I. Pócsik and I. Kósa Somogyi 469

Effect of chemical etching on the photoluminescence of As–Ge–Se chalcogenide glassy semiconductors
Milov, V.V. and T.N. Mamontova 473

Optical properties of chalcogenide glassy semiconductors in multilayer structures
Mikhailov, N.I., I.V. Bekitcheva, E.N. Voronkov, A.I. Popov and L.Yu. Smirnova 477

Optical properties of Ge–As–S thin films
Minkov, D., E. Vateva, E. Skordeva, D. Arsova and M. Nikiforova 481

Investigation of structural correlations in disordered materials by Raman scattering measurements
Malinovsky, V.K., V.N. Novikov and A.P. Sokolov 485

Section 14. Chalcogenides: photo- and radiation-induced changes

Photoinduced processes in chalcogenide vitreous semiconductor–metal structures (Invited)
Lyubin, V.M. and A.V. Kolobov 489

Photo-induced phenomena in chalcogenide structures (Invited)
Vateva, E. and D. Nesheva 497

Photoinduced changes of mechanical properties in amorphous arsenic chalcogenide films
Manika, I. and J. Teteris 505

Photoinduced changes of refractive index in amorphous arsenic and antimony chalcogenides
Shvarts, K.K., J.A. Teteris, I.P. Manika, M.J. Reinfelde and V.I. Gerbreder 509

Photoinduced effects in Ge–Sb–S glasses and amorphous layers
Vlček, M., M. Frumar and A. Vidourek 513

Photoenhanced dissolution and diffusion of Ag in As_2S_x layers
Wágner, T., M. Frumar and L. Beneš 517

Spectroscopic investigations of induced processes in arsenic sulfide chalcogenide glasses
Budinas, T., P. Mačkus, I.V. Savytsky and O.I. Shpotyuk 521

Effect of ^{60}Co γ-radiation on the solubility of glassy selenium
Domoryad, I.A., M.G. Spirina and N.I. Timochina 525

Mechanism of laser-induced optical anisotropy in chalcogenide glasses
Jánossy, I., J. Hajtó and W.K. Choi 529

Computer-assisted modelling of photostructural transformations in amorphous As_3Se_2
Popescu, M. 533

Photoabsorption and photorefraction in glassy As_2Se_3 films under pulsed excitation
Mazets, T.F., S.K. Pavlov, E.A. Smorgonskaya and E.I. Shifrin 537

Temperature dependence of the photodissociation of a-As_2S_3
Stoycheva, R., P. Simidchieva and A. Buroff 541

Section 15. Chalcogenides: device physics, switching, applications

Ionic conducting glasses for batteries and wave-guide devices (Invited)
Feltz, A. 545

$Ge_x(Se_{1-y}Te_y)_{1-x}$ glasses for optical application
Ležal, D., I. Kašík and J. Götz 557

Optimizing of multicomponent seleno-telluride glasses for optical fibers applied to power transmission at 10.6 μm
Trnovcová, V., T. Pažurová, T. Šrámková and D. Ležal 561

Optical effects in thin film waveguides of glassy arsenic sulphide
Andriesh, A.M., O.V. Bolshakov, V.V. Zhitar and A.A. Popesku 565

Some applications of Ge–S–A^{III} glasses in microelectronics and optics
Ivanova, Z. 569

On the generation of optically wave-guiding layers in silicate glasses by doping with heavy metals
Kaps, Ch. and R. Göring 573

Utilization of chalcogenide glasses in infrared optics
Cimpl, Z. and F. Kosek 577

Submicron resolution amorphous chalcogenide optical grid
Hajtó, É. and G. Zentai 581

Photolithographic performance of a-As_2S_3 resists under synchrotron X-ray irradiation
Buroff, A. and A.D. Rush 585

Selective solubility of some silver–chalcogenide glasses
Mitkova, M. and Z. Boncheva-Mladenova 589

The effect of DC electric field on Ag migration in glassy Ge_2S_3
Kudoyarova, V.Kh. 593

Kinetic model for switching in chalcogenide glassy semiconductors
Glebov, A.S. and G.V. Rozhkova 597

Fast switching in sandwich structures on the basis of Ge_xTe_{1-x} alloys
Babenskas, E., S. Balevičius, A. Česnys, A. Poškus and N. Siktorov 601

Electronic processes and the dynamics of the highly conductive filament formation in bulk samples of a chalcogenide vitreous semiconductor under high electric field
Kalmykova, N.P., E.A. Smorgonskaya, V. Kh. Shpunt 605

Microwave noise and transient on-characteristics as an efficient source of information in investigating the on-state of the switching structures
Česnys, A., A. Oginskas, K. Gaška and V. Lisauskas 609

Section 16. Oxides and other glasses

Influence of In on some electrical, photoelectrical and optical properties of a-CdS
Nesheva, D. and E. Vateva 613

Semiconducting niobate–phosphate glasses. Structure and properties
Rachkovskaya, G.E. and N.M. Bobkova 617

Configuration and possible interactions of structural elements in boron–bismuth–oxide glassy semiconductors
Modebadze, O.E. 621

Semiconducting oxide glasses containing vanadium and copper simultaneously
Bogomolova, L.D., I.V. Filatova, M.P. Glassova and S.N. Spasibkina 625

Polaronic hopping conduction in vanadium and iron phosphate glasses
Murawski, L. 629

Structural study of amorphous Cd–As films
Burian, A., P. Lecante, A. Mosset and J. Galy 633

Structure of amorphous thin films of WO_3 and MoO_3
Ramans, G. M., J.V. Gabrusenoks, A.R. Lusis and A.A. Patmalnieks 637

Section 17. Organic materials

Optical and electrical energy gap investigations in low-temperature glassy carbon layers
Turło, J. and K. Rozwadowska-Jaśniewska 641

Anomalous transport in disordered organic layers
Ziołkowska-Pawlak, B. and W. Mycielski 645

Relation between structural perfection and electrical conduction in organic solids
Bak, G.W. and A. Szymański 649

Dielectric measurements as an indicator of changes of energetic structure of aromatic hydrocarbons
Bak, G.W. and A. Lipínski 653

Photoelectric and photodielectric properties of amorphous 4-nitro-4'-amino-diphenyl layers
Kovalskij, P.N., N.M. Kravciv, P. Mackus and K. Lipskis 657

Some physical properties of powdered milk and lactalbumin
Kispéter, J. and L. Horváth 661

Closing address
Grigorovici, R. 665

Author index 669

Subject index 680